

# CALIFORNIA DEPARTMENT OF PARKS AND RECREATION ACQUISITION AND DEVELOPMENT DIVISION ARMSTRONG REDWOODS STATE RESERVE WATER SYSTEM IMPROVEMENTS

CSFM # 01-49-11-0002



ACQUISITION &  
DEVELOPMENT DIVISION  
One Capitol Mall  
Sacramento, CA  
95814-3229



CALIFORNIA STATE FIRE MARSHAL APPROVED  
Approval of this plan does not authorize or  
approve any omission of deviation from  
applicable regulations. Final approval is  
subject to field inspection. One set of  
approved plans shall be available on the  
project site at all times.

Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

DPR ACCESS COMPLIANCE REVIEW  
ACCESSIBILITY SECTION  
CERTIFICATION # \_\_\_\_\_

Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

ACCESSIBILITY COMPLIANCE AND STATE FIRE  
MARSHAL SIGNED ORIGINALS ARE ON FILE AT  
THE DEPARTMENT OF PARKS AND RECREATION,  
NORTH RIVER SERVICE CENTER

DESIGNED: CJC

DRAWN: CJC

CHECKED: PHH

DATE: DECEMBER 13, 2013

REVISIONS

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## THE PROJECT INCLUDES:

- WATER MAIN IMPROVEMENTS FROM THE WATER WELL NEAR THE PARK ENTRANCE TO THE RESTROOM NEAR THE UPPER PICNIC AREA AND TO THE WATER STORAGE TANK
- USING HORIZONTAL DIRECTIONAL DRILLING FROM:
  - PIT 1 TO PIT 0
  - PIT 1 TO PIT 2
  - PIT 2 TO PIT 3
  - PIT 3 TO PIT 4
- USING OPEN TRENCH INSTALLATION FROM:
  - PIT 3 TO THE MAINTENANCE & STORAGE BUILDINGS;
  - PIT 3 TO THE ADMINISTRATIVE BUILDING & EXISTING WATER STORAGE TANK; AND
  - PIT 1 TO THE WATER TREATMENT PLANT & RETURNING TO PIT 1 AND FROM PIT 0 TO THE WATER WELL;
- OPEN TRENCH INSTALLATION OF LATERALS TO THE VISITOR CENTER, MAINTENANCE SHOP, STORAGE AND ADMINISTRATION BUILDINGS AND RESTROOMS; AND
- INSTALLATION OF FOUR FIRE HYDRANTS.

## SCOPE OF WORK

1-ALL MATERIALS SHOWN OR NOTED ON THE PLANS ARE NEW UNLESS CALLED OUT OTHERWISE.

2-THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY ALL EXISTING CONDITIONS SHOWN OR DIMENSIONED HERE. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE STATE REPRESENTATIVE FOR RESOLUTION BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.

3-ALL WORK SHALL COMPLY WITH THE CURRENT EDITION OF THE FOLLOWING LISTED CODES, AND ALL OTHERS HAVING JURISDICTION OVER THE WORK.

2013 EDITION OF THE CALIFORNIA BUILDING CODE.  
2013 EDITION OF THE CALIFORNIA FIRE CODE.  
2013 EDITION OF THE CALIFORNIA ENERGY CODE.  
2013 EDITION OF THE CALIFORNIA ELECTRICAL CODE.  
2013 EDITION OF THE CALIFORNIA PLUMBING CODE.  
FEDERAL ACCESSIBILITY STANDARDS.

4-CONDUCT ALL WORK IN ACCORDANCE WITH THE LATEST SAFETY RULES AND REGULATIONS OF ALL AUTHORITIES AND AGENCIES HAVING JURISDICTION OVER THE WORK.

5-ALL WORK SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS. WHERE DETAILED INFORMATION OR CLARIFICATION IS REQUIRED, THE MATTER SHALL BE REFERRED TO THE STATE REPRESENTATIVE FOR WRITTEN RESOLUTION.

6-THE CONTRACTOR SHALL NOT SCALE THE DRAWINGS, BUT SHALL RELY ONLY ON THE WRITTEN DIMENSIONS GIVEN. IF A DISCREPANCY OCCURS OR NO DIMENSION IS GIVEN, THE CONTRACTOR SHALL NOTIFY THE STATE REPRESENTATIVE FOR WRITTEN CLARIFICATION BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.

7-PROTECT TREE ROOTS PER SPECIFICATION SECTION 015640DPR, HAND DIG IF NECESSARY.

8-PROVIDE FRAC-OUT CONTINGENCY PLAN PER SPECIFICATION SECTION 316100.

9-THESE PLANS WERE CREATED USING THREE SOURCES:

- THE BASE TOPOGRAPHY PROVIDED BY STATE PARKS (1948) WAS USED AS THE PRIMARY BASE. THE LAYOUT AND DIMENSIONS SHOWN HAVE NOT BEEN FIELD VERIFIED.
- SURVEYS PERFORMED BY LACO (SEPT. 2013) WERE USED IN THE UPPER PICNIC AREA AND THE PARKING LOT/TANK AREA. SEE SURVEY NOTES.
- THE PLANS PREPARED BY ANDREW JAMES RING III ARCHITECT, INC (2012) WERE USED FOR ELEVATION CONTROL POINTS AND THE LOCATION OF THE EXISTING WATER MAIN IN THE PARKING LOT/TANK AREA. THE LAYOUT AND DIMENSIONS SHOWN HAVE NOT BEEN FIELD VERIFIED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING ALL DIMENSIONS AND QUANTITIES.

## GENERAL NOTES

1	DETAIL NUMBER
A1	SHEET NUMBER
X-X'	DIMENSION LINE
+	FACE OF MATERIAL
+	BENCHMARK
+	BORING
+	CONTROL POINT
+	(E) FIRE HYDRANT
+	FIRE HYDRANT
+	GATE VALVE
+	HOSE BIB
+	JOINT UTILITY POLE
+	BENCH
+	PULL BOX
+	SS CLEANOUT
+	WATER METER
+	(E) WATER WELL
+	EDGE OF PAVEMENT
+	FLOW LINE
+	PHONE LINE
+	FENCE
+	TREES
+	(E) CONTOUR
+	(E) WATER MAIN
+	WATER MAIN HDD
+	WATER MAIN TRENCH

## SYMBOLS LEGEND

ASB	ASBESTOS PIPE
B#	BORING #
BP	BEGINNING POINT OF ALIGNMENT
CP	CONTROL POINT
DIA#	DIAMETER
(E)	EXISTING
EG	EXISTING GROUND
EL	ELEVATION
EP	END POINT OF ALIGNMENT
FH	FIRE HYDRANT
GV	GATE VALVE
HB	HOSE BIB
HDD	HORIZONTAL DIRECTIONAL DRILLING
ID	INSIDE DIAMETER
MID	MIDPOINT OF CURVE
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
PC	POINT OF CURVATURE
PCC	POINT OF CONTINUING CURVE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
R#	RADIUS
STL	STEEL
SS	SANITARY SEWER
SST	STAINLESS STEEL
TYP	TYPICAL
W	WATER

## ABBREVIATIONS

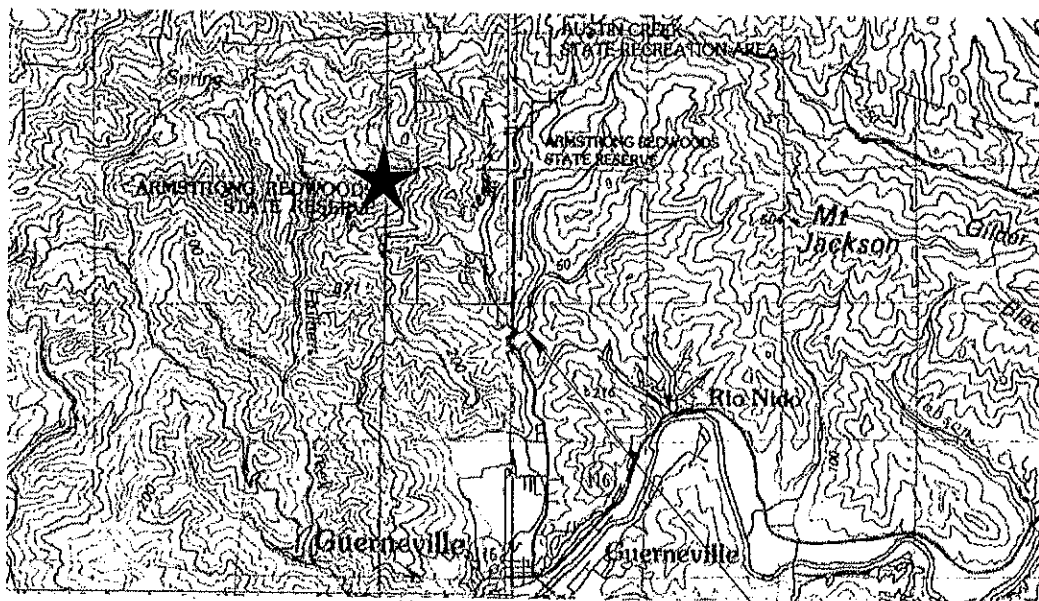
CONCRETE	CONCRETE
UNDISTURBED SOIL	UNDISTURBED SOIL
GRAVEL/ROCK	GRAVEL/ROCK
ROAD	ROAD

## MATERIAL LEGEND



VICINITY MAP

NOT TO SCALE



LOCATION MAP

NOT TO SCALE

#	SHEET	TITLE
1	0.0	COVER SHEET
2	1.0	SITE WATER SYSTEM IMPROVEMENTS PLAN
3	1.1	IMPROVEMENTS FOR PARK ENTRANCE
4	1.2	IMPROVEMENTS FOR INTERSECTION TO THEATRE AREA
5	1.3	IMPROVEMENTS FOR MAIN PARK AREA
6	1.4	IMPROVEMENT PLAN FOR UPPER PICNIC AND TANK AREA
7	2.0	HORIZONTAL DIRECTIONAL DRILLING (HDD) PROFILES
8	3.0	HORIZONTAL DIRECTIONAL DRILLING (HDD) DETAILS
9	3.1	WATER SYSTEM DETAILS

## SHEET INDEX

- THE BEARINGS FOR THE LACO SURVEY ARE BASED ON THE COMPASS READING OF N60°W FROM CP 100 TO 101.
- THE ELEVATIONS FOR THIS SURVEY ARE BASED ON BENCHMARK SHOWN AT CP 102. A USGS DISK STAMPED "101m 193 171". ELEVATION = 172.34.
- THE UNDERGROUND UTILITY LOCATIONS SHOWN HEREON WERE BASED ON VISIBLE EVIDENCE. THEREFORE LACO ASSOCIATES ASSUMES NO LIABILITY FOR THE LOCATION OR EXISTENCE OF UTILITIES THAT MAY NOT HAVE BEEN VISIBLE AT THE TIME OF THIS SURVEY. LACO ASSOCIATES MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN HEREON ARE A COMPREHENSIVE REPRESENTATION OF ALL UTILITIES WITHIN THESE MAPPING LIMITS, EITHER IN SERVICE OR ABANDONED.

## SURVEY NOTES

PLEASE INCLUDE FALL CREEK ENGINEERING ON ALL INQUIRIES.

## PRIMARY CONSULTANT

CIVIL/ENVIRONMENTAL ENGINEER  
CONTACT: PETER HAASE, PE  
P: (831) 426-9054  
F: (831) 426-4932

FALL CREEK ENGINEERING, INC  
PO BOX 7894  
SANTA CRUZ, CA 95061

## SUB-CONSULTANTS

GEOTECHNICAL ENGINEER  
CONTACT: JEREMY ZORNE, PE, GE  
P: (916) 852-9118  
F: (916) 852-9132

GEOCON CONSULTANTS, INC.  
3160 GOLD VALLEY ROAD, SUITE 800  
RANCHO CORDOVA, CA 95742

## SURVEYOR

CONTACT: CHRIS WATT, CEG, CHG  
P: (707) 443-5054  
F: (707) 443-0553

LACO ASSOCIATES  
21 WEST 4TH STREET  
EUREKA, CA 95502

## CONSULTANT INFORMATION

ARMSTRONG REDWOODS STATE RESERVE  
GUERNEVILLE, CALIFORNIA  
SONOMA COUNTY  
LAT: 38.53451 N,  
LONG: -123.01071 W

## PROJECT ADDRESS

ARMSTRONG REDWOODS  
STATE RESERVE  
WATER SYSTEM IMPROVEMENTS  
COVER SHEET

DRAWING NO.  
30269.001

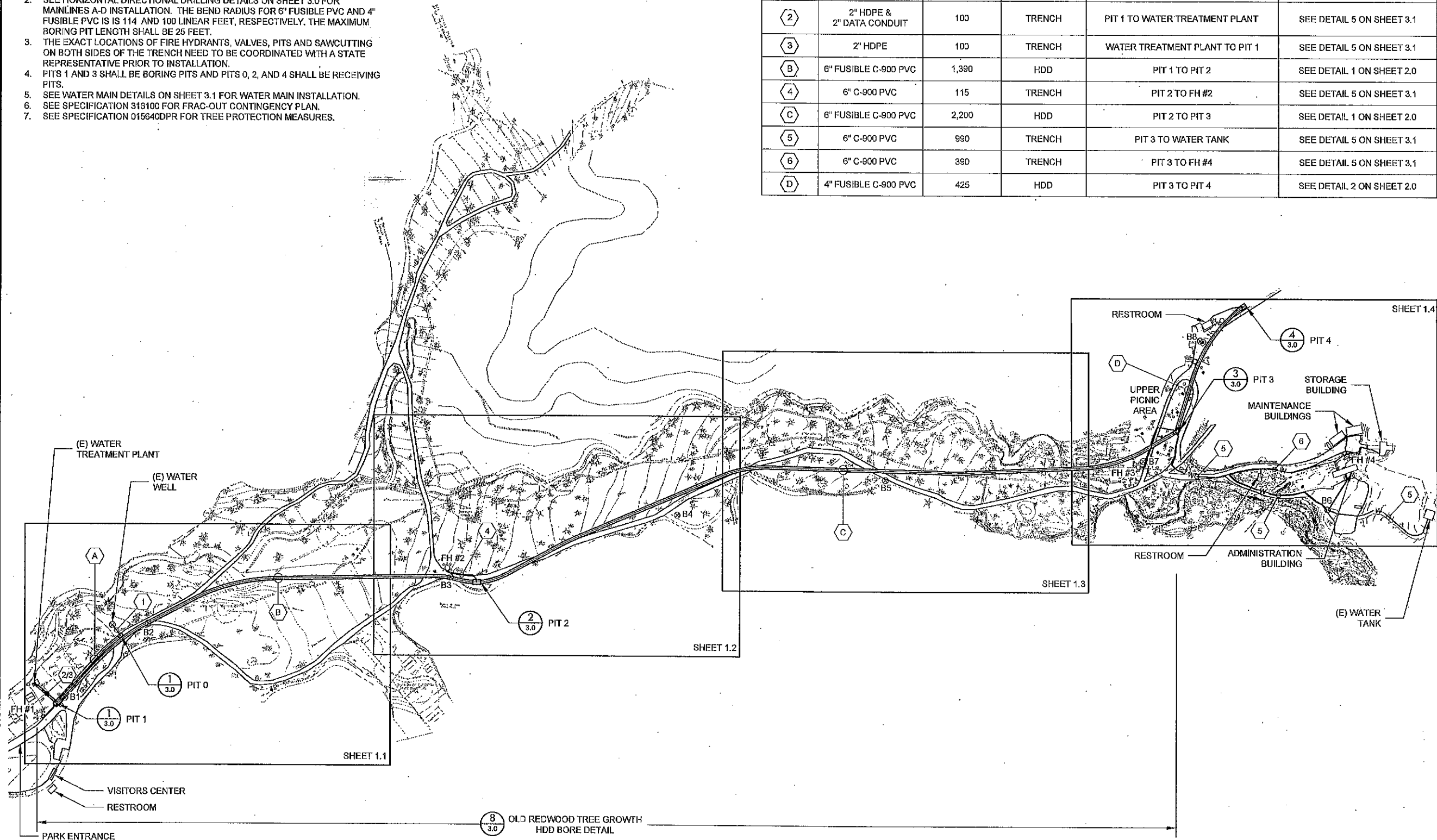
SHEET NO.

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1 OF 9

- NOTES:
- EXPLORATORY BORINGS WERE PERFORMED BY GEOCON ON SEPTEMBER 19 & 20, 2013. SOIL BORINGS WERE TAKEN AT THE LOCATIONS INDICATED ON THIS MAP. SEE GEOCON'S LIMITED GEOTECHNICAL INVESTIGATION DATED OCTOBER 8, 2013 FOR MORE DETAILS.
  - SEE HORIZONTAL DIRECTIONAL DRILLING DETAILS ON SHEET 3.0 FOR MAINLINES A-D INSTALLATION. THE BEND RADIUS FOR 6" FUSIBLE PVC AND 4" FUSIBLE PVC IS 114 AND 100 LINEAR FEET, RESPECTIVELY. THE MAXIMUM BORING PIT LENGTH SHALL BE 25 FEET.
  - THE EXACT LOCATIONS OF FIRE HYDRANTS, VALVES, PITS AND SAWCUTTING ON BOTH SIDES OF THE TRENCH NEED TO BE COORDINATED WITH A STATE REPRESENTATIVE PRIOR TO INSTALLATION.
  - PITS 1 AND 3 SHALL BE BORING PITS AND PITS 0, 2, AND 4 SHALL BE RECEIVING PITS.
  - SEE WATER MAIN DETAILS ON SHEET 3.1 FOR WATER MAIN INSTALLATION.
  - SEE SPECIFICATION 316100 FOR FRAC-OUT CONTINGENCY PLAN.
  - SEE SPECIFICATION 015640DPR FOR TREE PROTECTION MEASURES.

MAINLINE PIPE SCHEDULE AND NOTES					
#	TYPE	LENGTH (FT)	METHOD	LOCATION	NOTES
1	2" HDPE & 2" DATA CONDUIT	45	TRENCH	WELL TO PIT 0	SEE DETAIL 5 ON SHEET 3.1
A	2" HDPE & 2" DATA CONDUIT	275	HDD	PIT 0 TO PIT 1	SEE DETAIL 3 ON SHEET 2.0
2	2" HDPE & 2" DATA CONDUIT	100	TRENCH	PIT 1 TO WATER TREATMENT PLANT	SEE DETAIL 5 ON SHEET 3.1
3	2" HDPE	100	TRENCH	WATER TREATMENT PLANT TO PIT 1	SEE DETAIL 5 ON SHEET 3.1
B	6" FUSIBLE C-900 PVC	1,390	HDD	PIT 1 TO PIT 2	SEE DETAIL 1 ON SHEET 2.0
4	6" C-900 PVC	115	TRENCH	PIT 2 TO FH #2	SEE DETAIL 5 ON SHEET 3.1
C	6" FUSIBLE C-900 PVC	2,200	HDD	PIT 2 TO PIT 3	SEE DETAIL 1 ON SHEET 2.0
5	6" C-900 PVC	990	TRENCH	PIT 3 TO WATER TANK	SEE DETAIL 5 ON SHEET 3.1
6	6" C-900 PVC	390	TRENCH	PIT 3 TO FH #4	SEE DETAIL 5 ON SHEET 3.1
D	4" FUSIBLE C-900 PVC	425	HDD	PIT 3 TO PIT 4	SEE DETAIL 2 ON SHEET 2.0



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CERTIFICATION # \_\_\_\_\_

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DESIGNED: CJC  
DRAWN: CJC  
CHECKED: PHH  
DATE: DECEMBER 13, 2013

REVISIONS  
DATE

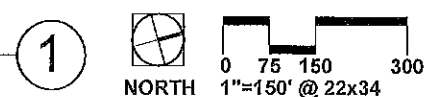
ARMSTRONG REDWOODS  
STATE RESERVE  
WATER SYSTEM IMPROVEMENTS  
SITE WATER SYSTEM  
IMPROVEMENTS PLAN

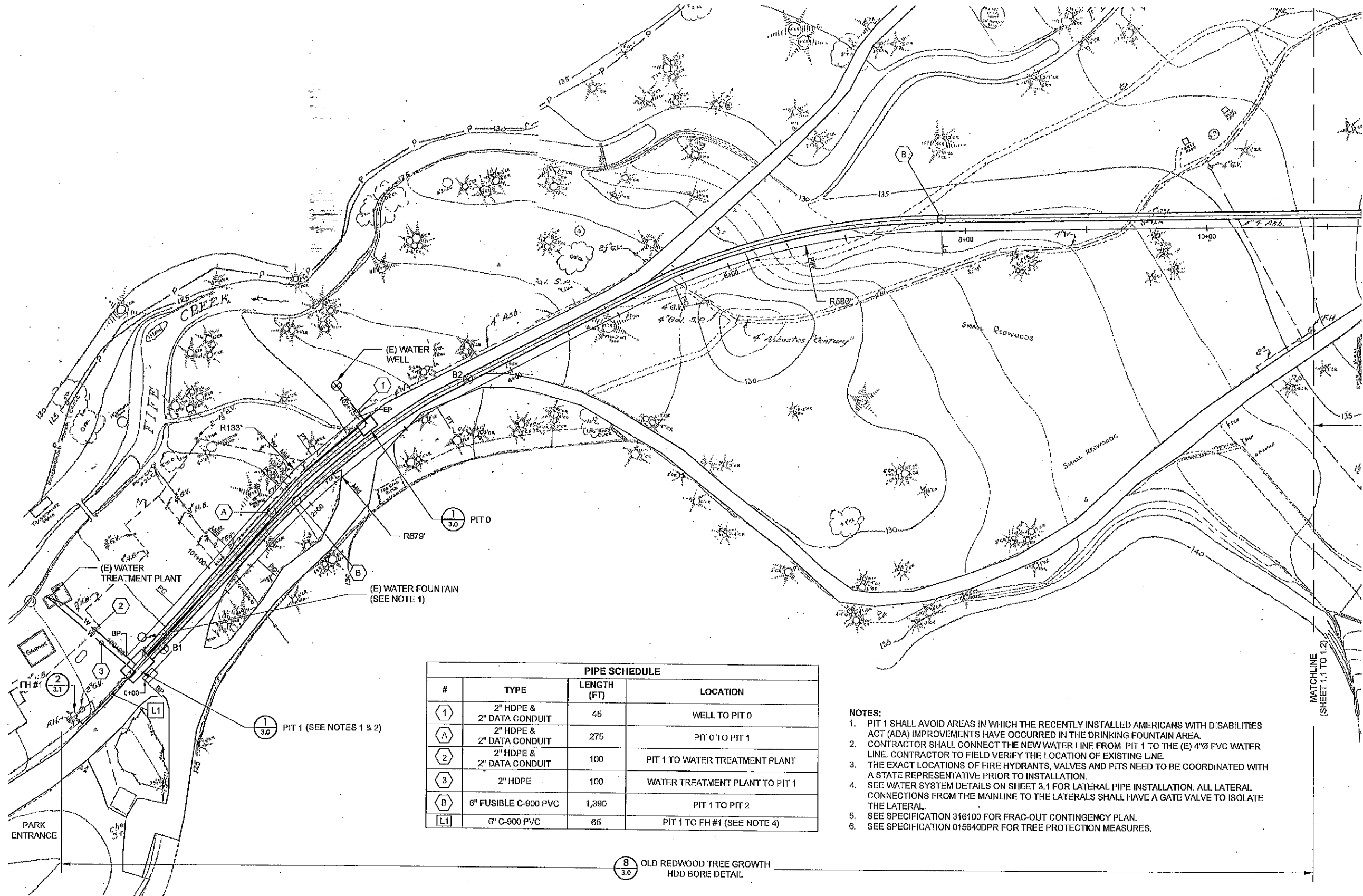
DRAWING NO.  
30269.002

SHEET NO.  
1.0  
2 OF 9

SITE WATER SYSTEM IMPROVEMENT PLAN

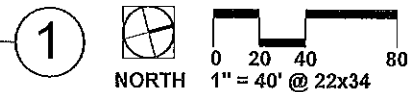
SCALE: 1" = 150' @ 22x34





IMPROVEMENT PLAN FOR PARK ENTRY AREA

SCALE: 1" = 40' @ 22x34



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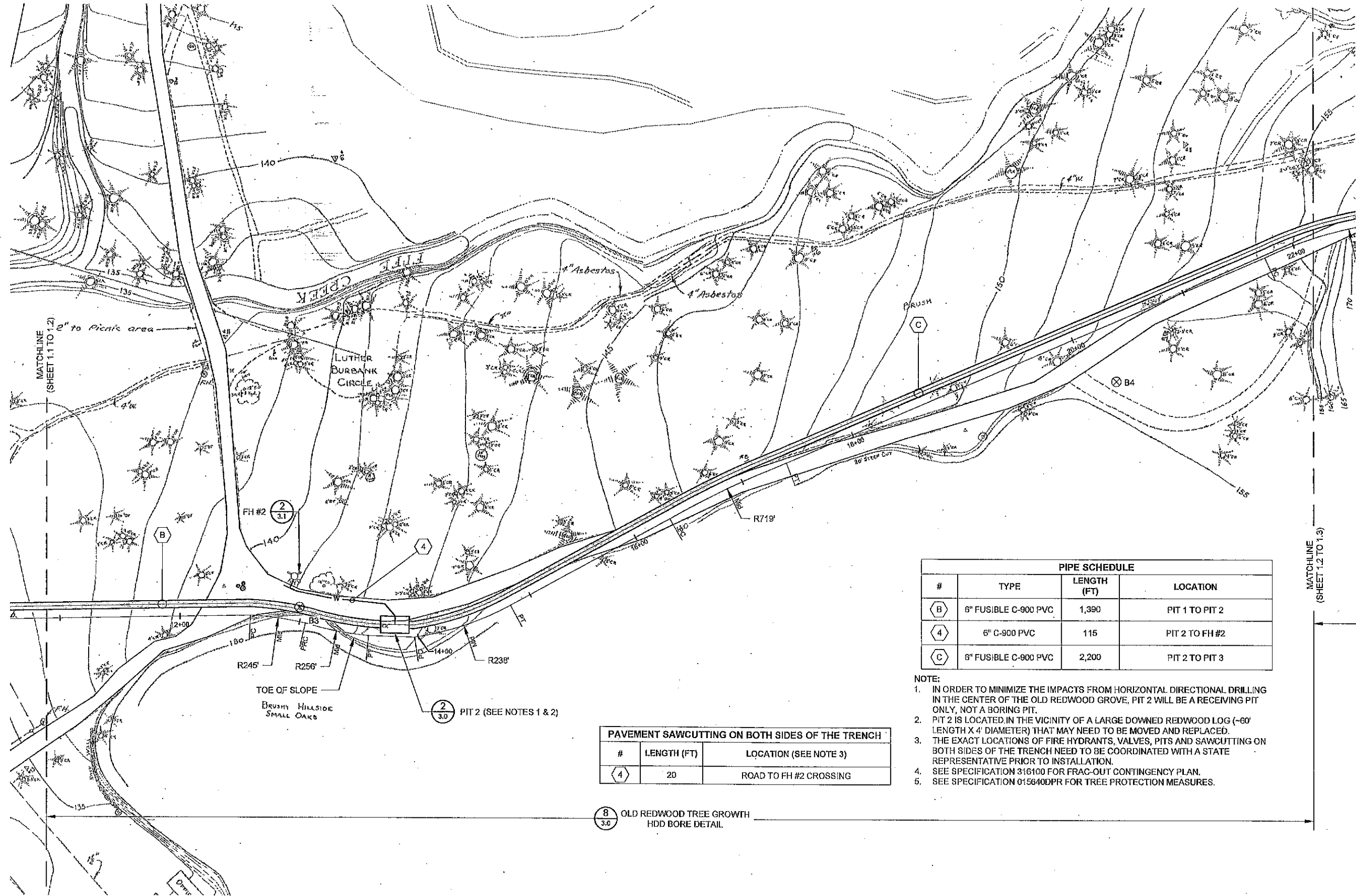
ARMSTRONG REDWOODS  
STATE RESERVE  
WATER SYSTEM IMPROVEMENTS  
**IMPROVEMENTS FOR  
PARK ENTRANCE AREA**

DRAWING NO.  
30269.003

SHEET NO.

1.1

3 OF 9



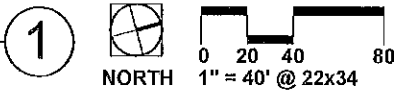
PAVEMENT SAWCUTTING ON BOTH SIDES OF THE TRENCH		
#	LENGTH (FT)	LOCATION (SEE NOTE 3)
4	20	ROAD TO FH #2 CROSSING

PIPE SCHEDULE			
#	TYPE	LENGTH (FT)	LOCATION
B	6" FUSIBLE C-900 PVC	1,390	PIT 1 TO PIT 2
4	6" C-900 PVC	115	PIT 2 TO FH #2
C	6" FUSIBLE C-900 PVC	2,200	PIT 2 TO PIT 3

- NOTE:
1. IN ORDER TO MINIMIZE THE IMPACTS FROM HORIZONTAL DIRECTIONAL DRILLING IN THE CENTER OF THE OLD REDWOOD GROVE, PIT 2 WILL BE A RECEIVING PIT ONLY, NOT A BORING PIT.
  2. PIT 2 IS LOCATED IN THE VICINITY OF A LARGE DOWNED REDWOOD LOG (~60' LENGTH X 4' DIAMETER) THAT MAY NEED TO BE MOVED AND REPLACED.
  3. THE EXACT LOCATIONS OF FIRE HYDRANTS, VALVES, PITS AND SAWCUTTING ON BOTH SIDES OF THE TRENCH NEED TO BE COORDINATED WITH A STATE REPRESENTATIVE PRIOR TO INSTALLATION.
  4. SEE SPECIFICATION 316100 FOR FRAC-OUT CONTINGENCY PLAN.
  5. SEE SPECIFICATION 015840DPR FOR TREE PROTECTION MEASURES.

8  
3.0  
OLD REDWOOD TREE GROWTH  
HDD BORE DETAIL

IMPROVEMENT PLAN FOR INTERSECTION TO THEATRE AREA  
SCALE: 1" = 40' @ 22x34



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ARMSTRONG REDWOODS  
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WATER SYSTEM IMPROVEMENTS  
IMPROVEMENTS FOR  
INTERSECTION TO THEATRE AREA

DRAWING NO.  
30269.004

SHEET NO.  
1.2  
4 OF 9

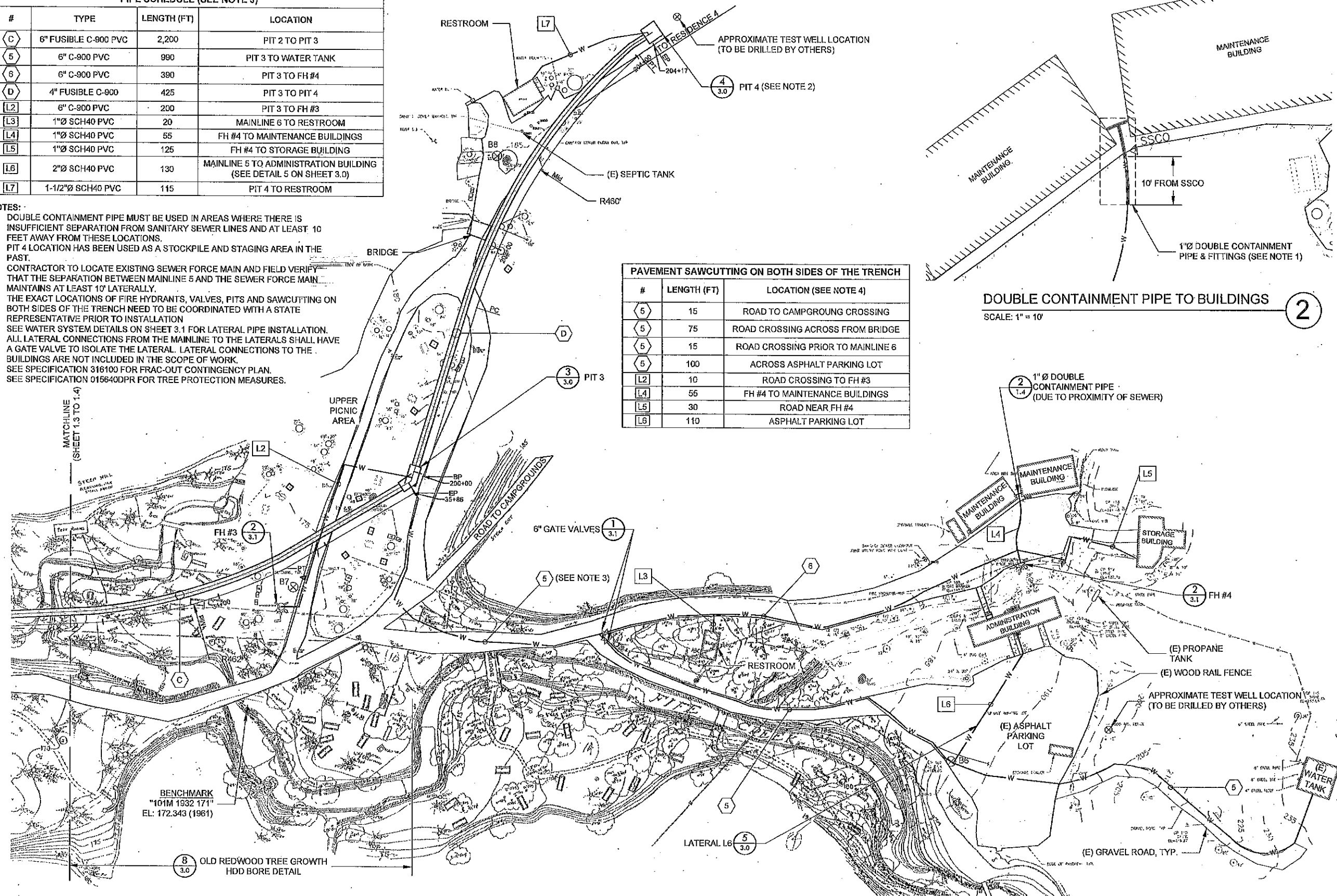




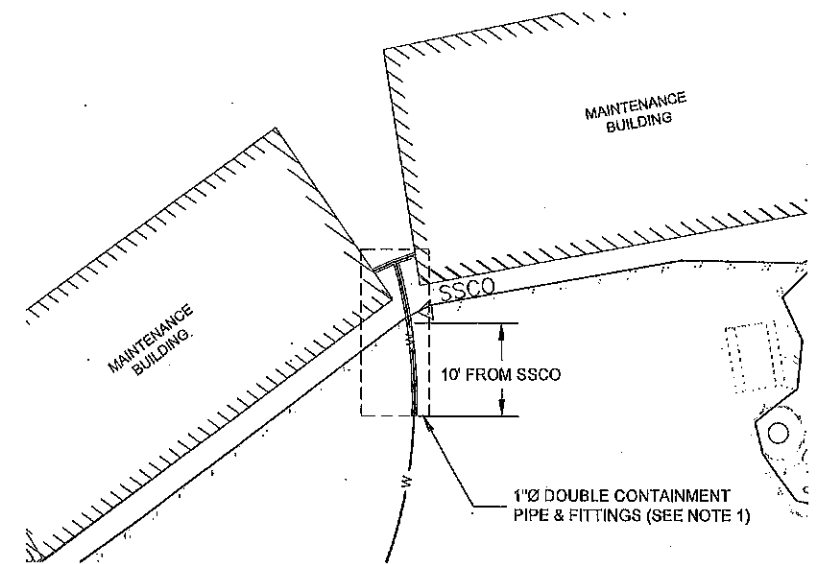
PIPE SCHEDULE (SEE NOTE 3)			
#	TYPE	LENGTH (FT)	LOCATION
C	6" FUSIBLE C-900 PVC	2,200	PIT 2 TO PIT 3
5	6" C-900 PVC	990	PIT 3 TO WATER TANK
6	6" C-900 PVC	390	PIT 3 TO FH #4
D	4" FUSIBLE C-900	425	PIT 3 TO PIT 4
L2	6" C-900 PVC	200	PIT 3 TO FH #3
L3	1"Ø SCH40 PVC	20	MAINLINE 6 TO RESTROOM
L4	1"Ø SCH40 PVC	55	FH #4 TO MAINTENANCE BUILDINGS
L5	1"Ø SCH40 PVC	125	FH #4 TO STORAGE BUILDING
L6	2"Ø SCH40 PVC	130	MAINLINE 5 TO ADMINISTRATION BUILDING (SEE DETAIL 5 ON SHEET 3.0)
L7	1-1/2"Ø SCH40 PVC	115	PIT 4 TO RESTROOM

## NOTES:

- DOUBLE CONTAINMENT PIPE MUST BE USED IN AREAS WHERE THERE IS INSUFFICIENT SEPARATION FROM SANITARY SEWER LINES AND AT LEAST 10 FEET AWAY FROM THESE LOCATIONS.
- PIT 4 LOCATION HAS BEEN USED AS A STOCKPILE AND STAGING AREA IN THE PAST.
- CONTRACTOR TO LOCATE EXISTING SEWER FORCE MAIN AND FIELD VERIFY THAT THE SEPARATION BETWEEN MAINLINE 5 AND THE SEWER FORCE MAIN MAINTAINS AT LEAST 10' LATERALLY.
- THE EXACT LOCATIONS OF FIRE HYDRANTS, VALVES, PITS AND SAWCUTTING ON BOTH SIDES OF THE TRENCH NEED TO BE COORDINATED WITH A STATE REPRESENTATIVE PRIOR TO INSTALLATION.
- SEE WATER SYSTEM DETAILS ON SHEET 3.1 FOR LATERAL PIPE INSTALLATION. ALL LATERAL CONNECTIONS FROM THE MAINLINE TO THE LATERALS SHALL HAVE A GATE VALVE TO ISOLATE THE LATERAL. LATERAL CONNECTIONS TO THE BUILDINGS ARE NOT INCLUDED IN THE SCOPE OF WORK.
- SEE SPECIFICATION 316100 FOR FRAC-OUT CONTINGENCY PLAN.
- SEE SPECIFICATION 015640DPR FOR TREE PROTECTION MEASURES.



PAVEMENT SAWCUTTING ON BOTH SIDES OF THE TRENCH		
#	LENGTH (FT)	LOCATION (SEE NOTE 4)
5	15	ROAD TO CAMPGROUND CROSSING
5	75	ROAD CROSSING ACROSS FROM BRIDGE
5	15	ROAD CROSSING PRIOR TO MAINLINE 6
5	100	ACROSS ASPHALT PARKING LOT
L2	10	ROAD CROSSING TO FH #3
L4	55	FH #4 TO MAINTENANCE BUILDINGS
L5	30	ROAD NEAR FH #4
L6	110	ASPHALT PARKING LOT



DOUBLE CONTAINMENT PIPE TO BUILDINGS

SCALE: 1" = 10'

2



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ARMSTRONG REDWOODS  
STATE RESERVE  
WATER SYSTEM IMPROVEMENTS

# IMPROVEMENT PLAN FOR UPPER PICNIC AND TANK AREA

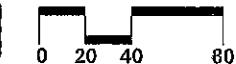
## IMPROVEMENT PLAN FOR UPPER PICNIC AND TANK AREA

SCALE: 1" = 40' @ 22x34

1



NORTH



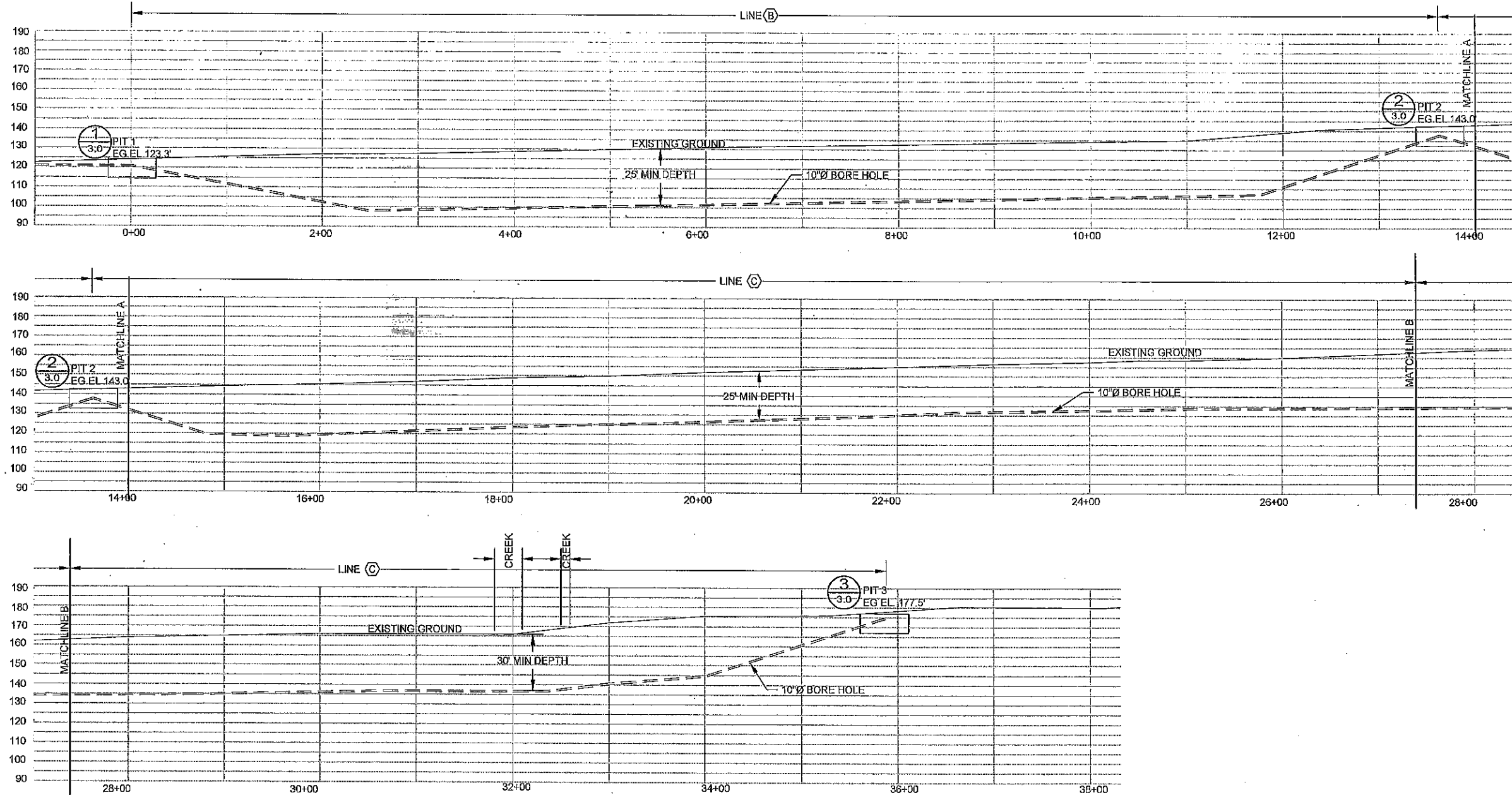
1" = 40' @ 22x34

DRAWING NO.  
30269.006

SHEET NO.

1.4

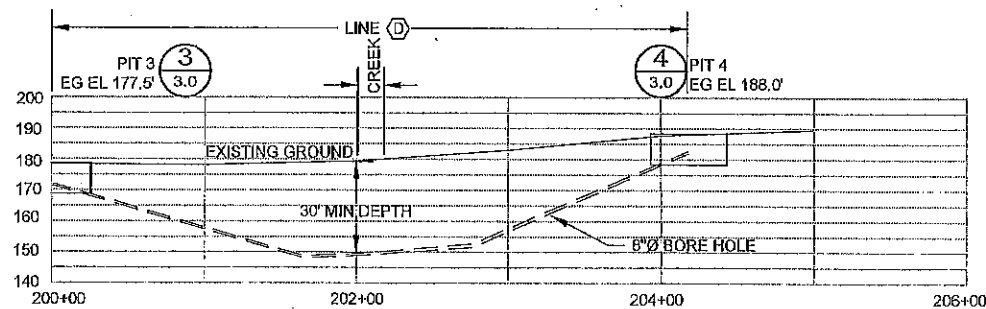
6 OF 9



PROFILE: PIT 1 - PIT 3 (LINES B & C)

SCALE: VERTICAL SCALE: 1" = 30', HORIZONTAL SCALE 1" = 15' @ 22x34

1

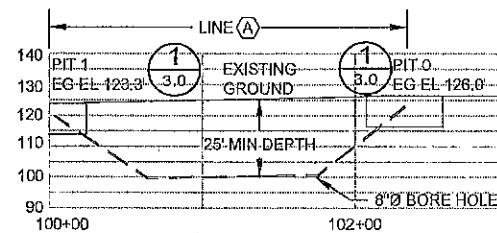


NOTE:  
PIT 4 LOCATION WAS NOT SURVEYED, THEREFORE ELEVATION AT SITE WAS APPROXIMATED AND SHOULD BE FIELD VERIFIED.

PROFILE: PIT 3 - PIT 4 (LINE D)

SCALE: VERTICAL SCALE: 1" = 30', HORIZONTAL SCALE 1" = 15' @ 22x34

2



PROFILE: PIT 1 - PIT 0 (LINE A)

SCALE: VERTICAL SCALE: 1" = 30', HORIZONTAL SCALE 1" = 15' @ 22x34

3

NOTE:  
ACTUAL PIT DIMENSIONS TO BE DETERMINED BY CONTRACTOR. PIT SHALL BE CONSTRUCTED TO MINIMIZE DISTURBANCE TO THE SURROUNDING AREA AND PITS ARE NOT TO EXCEED 25 FEET IN LENGTH.



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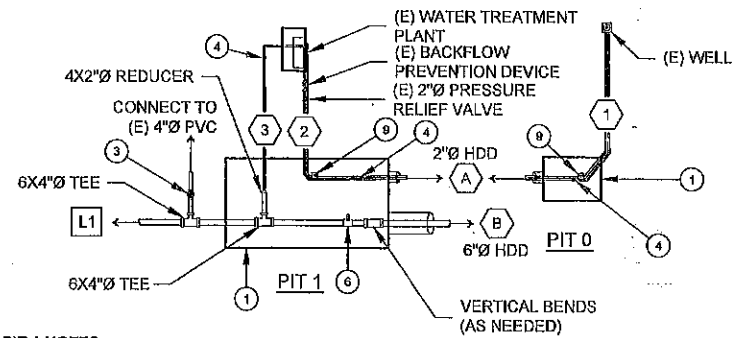
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ARMSTRONG REDWOODS  
STATE RESERVE  
WATER SYSTEM IMPROVEMENTS  
HORIZONTAL DIRECTIONAL  
DRILLING PROFILES

DRAWING NO.  
30269.007

SHEET NO.  
2.0  
7 OF 9

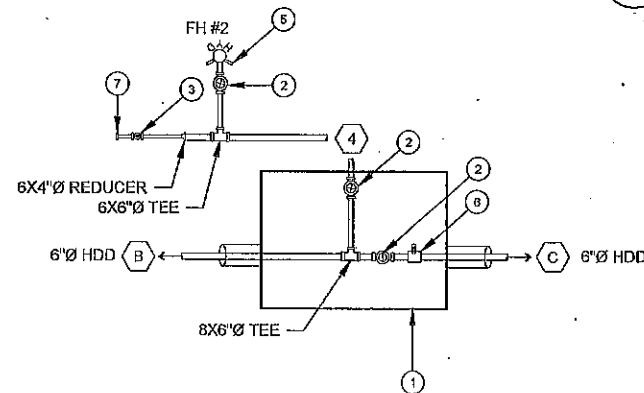


## PIT 1 NOTES:

- PIT 1 SHALL AVOID AREAS IN WHICH THE RECENTLY INSTALLED AMERICANS WITH DISABILITIES ACT (ADA) IMPROVEMENTS HAVE OCCURRED IN THE DRINKING FOUNTAIN AREA.
- CONTRACTOR SHALL CONNECT THE NEW WATER LINE FROM PIT 1 TO THE (E) 4" PVC WATER LINE. CONTRACTOR TO FIELD VERIFY THE LOCATION OF EXISTING LINE.

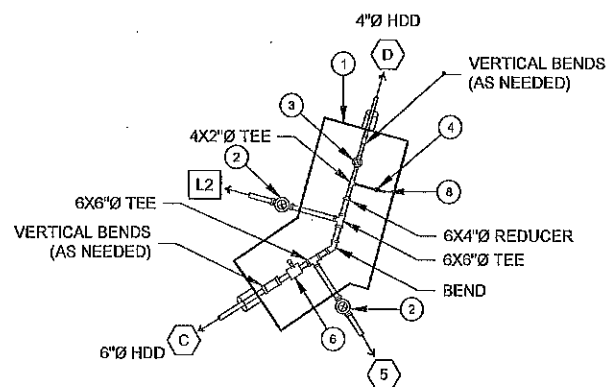
## PIT 1 AND PIT 0 PIPING CONFIGURATION

SCALE: NTS



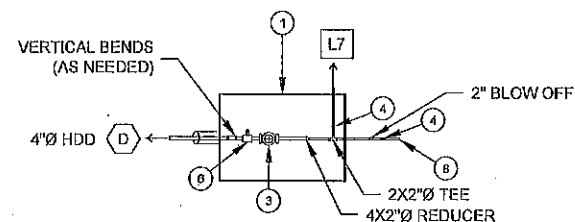
## PIT 2 AND FH#2 PIPING CONFIGURATION

SCALE: NTS



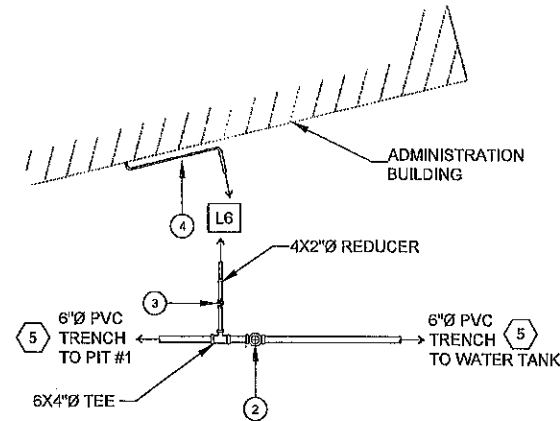
## PIT 3 PIPING CONFIGURATION

SCALE: NTS



## PIT 4 PIPING CONFIGURATION

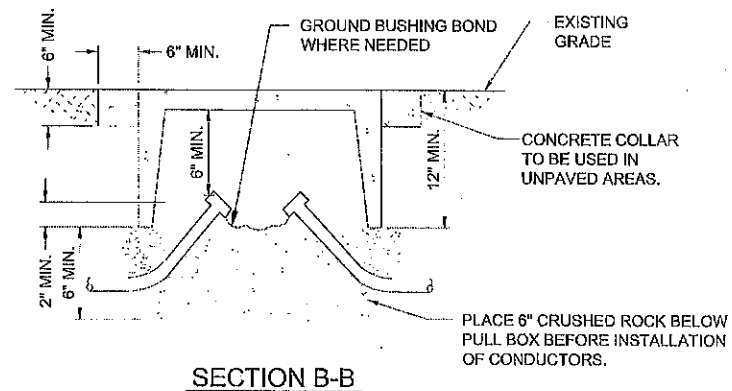
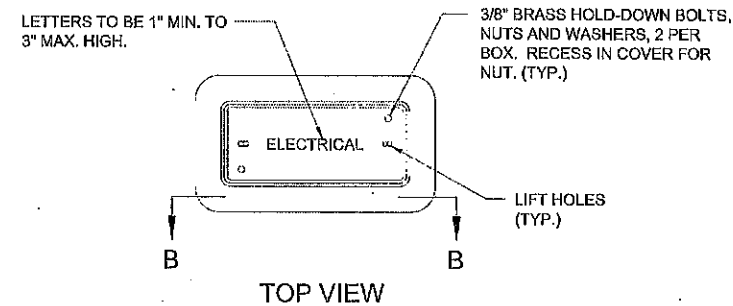
SCALE: NTS



NOTE:  
LATERAL CONNECTIONS TO THE BUILDINGS ARE NOT INCLUDED IN THE SCOPE OF WORK.

## LATERAL L6 PIPING CONFIGURATION

SCALE: NTS



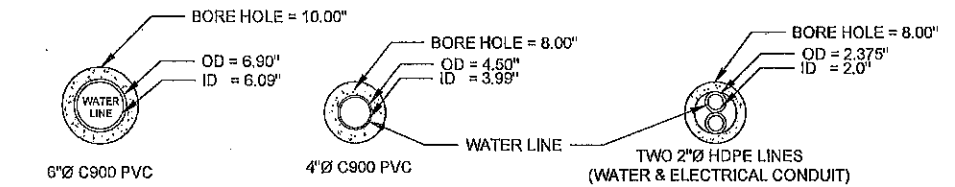
NOTE:  
PULL BOX TO BE A N36 CHRISTY BOX OR EQUIVALENT.

## PULL BOX DETAIL

SCALE: NTS

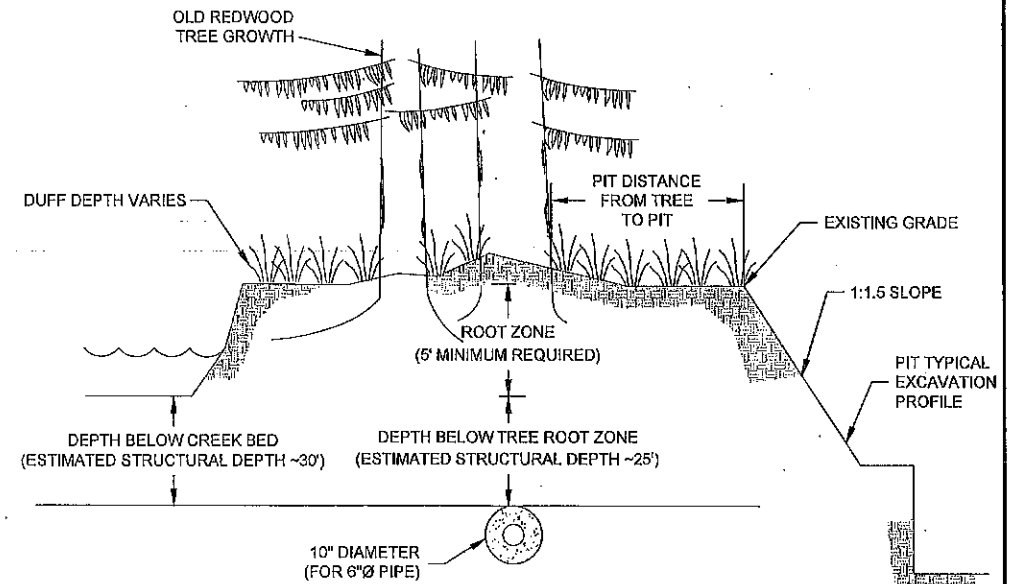
## PIT AND LATERAL DETAILS PLUMBING SCHEDULE AND NOTES

①	APPROXIMATE BOUNDARY OF BORING PIT	SEE NOTE 3 ON SHEET 3.0
②	6" GATE VALVE	SEE DETAIL 1 ON SHEET 3.1
③	4" GATE VALVE	SEE DETAIL 1 ON SHEET 3.1
④	2" GATE VALVE	SEE DETAIL 1 ON SHEET 3.1
⑤	FIRE HYDRANT	SEE DETAIL 2 ON SHEET 3.1
⑥	2" AIR RELIEF VALVE	SEE DETAIL 3 ON SHEET 3.1
⑦	4" CAP	SEE DETAIL 4 ON SHEET 3.1
⑧	2" CAP	SEE DETAIL 4 ON SHEET 3.1
⑨	ELECTRICAL PULL BOX	SEE DETAIL 6 ON SHEET 3.0



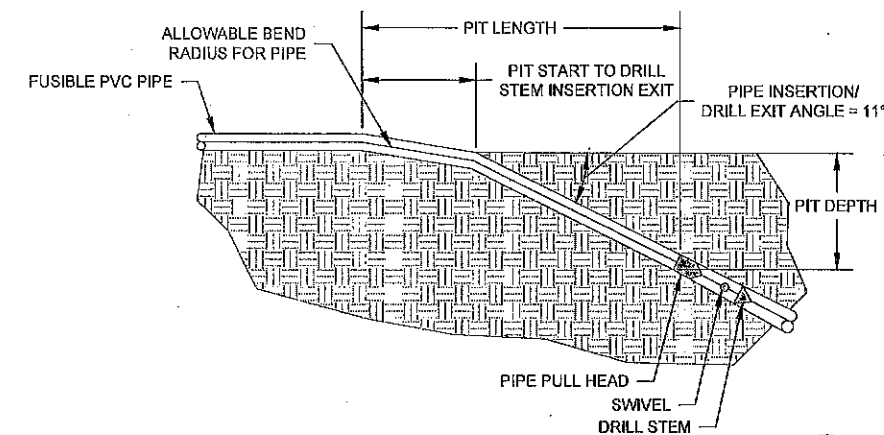
## TYPICAL HDD BORE CROSS SECTION

SCALE: AS DIMENSIONED



## TYPICAL HDD BORE DEPTH SCHEMATIC

SCALE: NTS



## TYPICAL HDD INSTALLATION (PIPE SUPPORTED BY GROUND)

SCALE: NTS

## NOTES:

- ALL HORIZONTAL DIRECTIONAL DRILLING SHALL BE PERFORMED IN CONFORMANCE WITH SPECIFICATION SECTIONS 316100 AND 333100.
- DEPTH OF WORK: ANY BORING IS REQUIRED TO BE AT LEAST 25' DEEP TO TOP OF BORE BELOW EXISTING REDWOOD TREE SOIL (NOT DUFF), WITH AN EXCEPTION FOR 11° DRILL INSERTION ANGLE. THE CONTRACTOR SHALL HAVE AT LEAST 10' (MIN) DEPTH TO TOP OF BORE FROM TOP OF SOIL (NOT DUFF) PER TYPICAL BORE DEPTH SCHEMATIC. IN ADDITION, ALL EXCAVATIONS WITHIN THE INDICATED OLD GROWTH REDWOOD INCLUDING ANY PIT, STEEL LINED PIT AND/OR TRENCH SHALL NOT BE CLOSER THAN 3 TIMES THE DIAMETER OF THE REDWOOD TREE AS INDICATED ABOVE, MEASURED FROM THE TOP OF SOIL (NOT DUFF), 4' DISTANCE FROM THE TRUNK OR FURTHER OUT FROM THE TREE TO CLEAR THE CROWN OF THE REDWOOD TRUNK.
- HDD PITS SHALL BE EXCAVATED AND SUPPORTED IN CONFORMANCE WITH SPECIFICATION SECTION 315000 TO PROTECT PUBLIC SAFETY. STEEL SHEET PILING IN PITS MAY BE REQUIRED TO OBTAIN CLEARANCES TO REDWOOD TREES. PIT SHALL BE CONSTRUCTED TO MINIMIZE DISTURBANCE TO THE SURROUNDING AREA AND PITS ARE NOT TO EXCEED 25 FEET IN LENGTH.
- THE APPROPRIATE ENVIRONMENTAL MONITORS, BIOLOGISTS, ARCHAEOLOGISTS, RESOURCE SPECIALISTS AND NATIVE AMERICAN REPRESENTATIVE SHALL BE PRESENT AS REQUIRED PER SECTION 00810 IN THE CONTRACT DOCUMENTS.



ACQUISITION & DEVELOPMENT DIVISION  
One Capitol Mall  
Sacramento, CA  
95814-3229



CALIFORNIA STATE FIRE MARSHAL - APPROVED  
Approval of this plan does not authorize or approve any omission of deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.  
Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

DPR ACCESS COMPLIANCE REVIEW  
ACCESSIBILITY SECTION  
CERTIFICATION # \_\_\_\_\_

Reviewed by \_\_\_\_\_ Date \_\_\_\_\_  
ACCESSIBILITY COMPLIANCE AND STATE FIRE MARSHAL SIGNED ORIGINALS ARE ON FILE AT THE DEPARTMENT OF PARKS AND RECREATION, NORTHERN SERVICE CENTER

DESIGNED: CJC  
DRAWN: CJC  
CHECKED: PHH  
DATE: DECEMBER 13, 2013

REVISIONS  
DATE

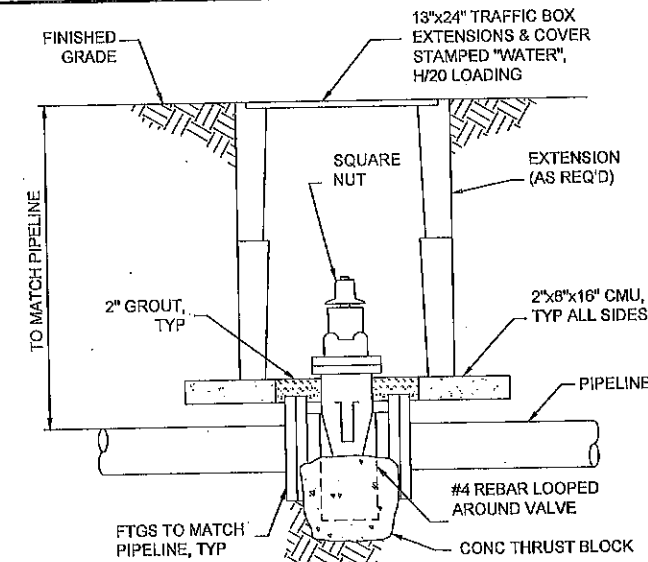
ARMSTRONG REDWOODS  
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DRILLING DETAILS

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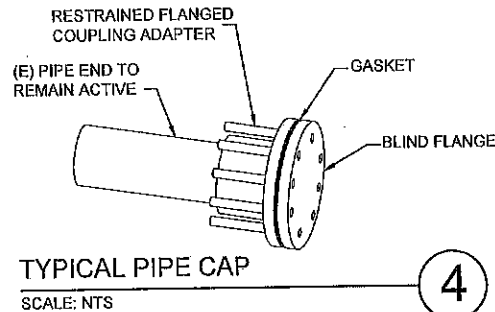
SHEET NO.  
3.0

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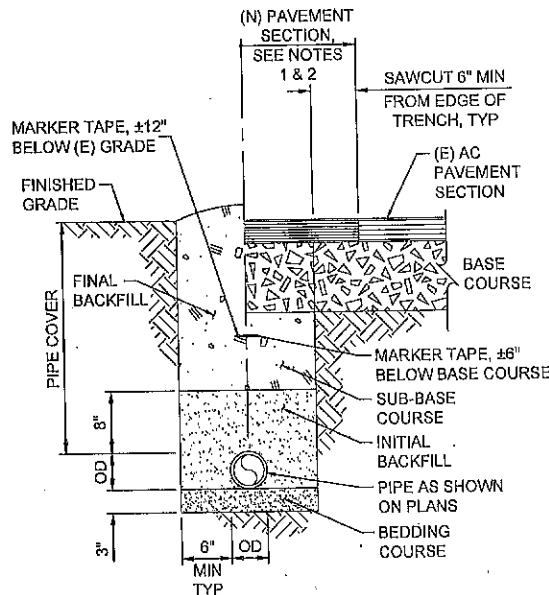




TYPICAL BURIED VALVE  
SCALE: NTS



4

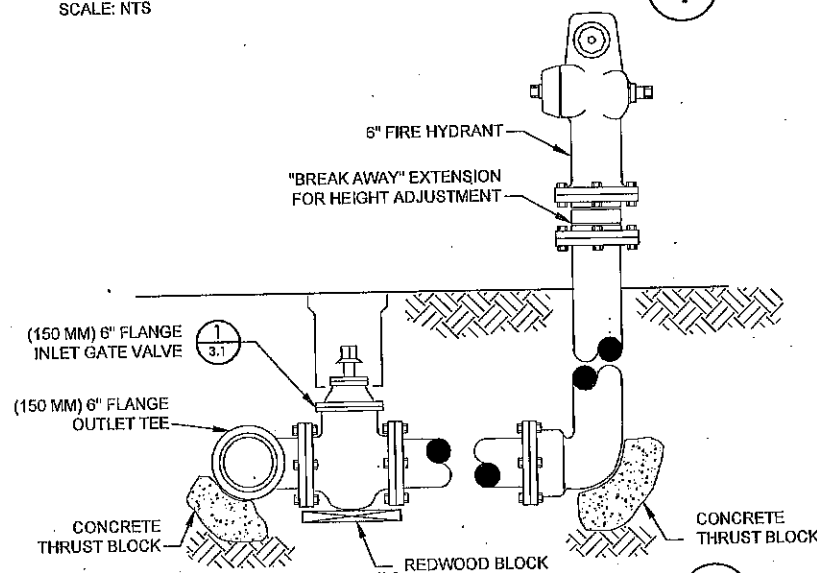


- NOTES:
1. UNLESS OTHERWISE SPECIFIED, PERMANENT PAVEMENT SHALL CONFORM IN QUALITY AND THICKNESS TO THE TYPE OF PAVEMENT REMOVED; BUT IN NO CASE SHALL BE LESS THAN THREE INCHES (3") OF ASPHALTIC CONCRETE ON SIX INCHES (6") OF BASE.
  2. EXISTING PAVEMENT SHALL BE SAWCUT AND REMOVED IN SUCH A MANNER SO AS NOT TO TEAR, BULGE OR DISPLACE ADJACENT PAVEMENT. EDGES SHALL BE CLEAN AND VERTICAL WHEN PRACTICAL, ALL CUTS SHALL BE PARALLEL OR PERPENDICULAR TO STREET EDGE OF PAVEMENT.
  3. ALL EXCAVATION BACKFILL AND COMPACTION SHALL, CONFORM TO THE REQUIREMENTS OF DIVISION 31, SECTION 312000 - EARTHWORK SPECIFICATIONS.
  4. NO SOLID BLOCKING PERMISSIBLE BENEATH PIPE.
  5. JETTING BACKFILL IS NOT PERMITTED.
  6. TRENCH EXCAVATION SHALL CONFORM TO CAL-OSHA STANDARDS.

PIPE COVER REQUIREMENTS FOR PIPES SMALLER THAN 12" Ø (UNLESS NOTED OTHERWISE)	
UTILITY NAME	MINIMUM COVER (INCHES)
WATER	30
SEWER	VARIES PER PLAN
SEWER FORCE MAIN	28
ELECTRICAL CONDUIT	24
TELEPHONE CONDUIT	20

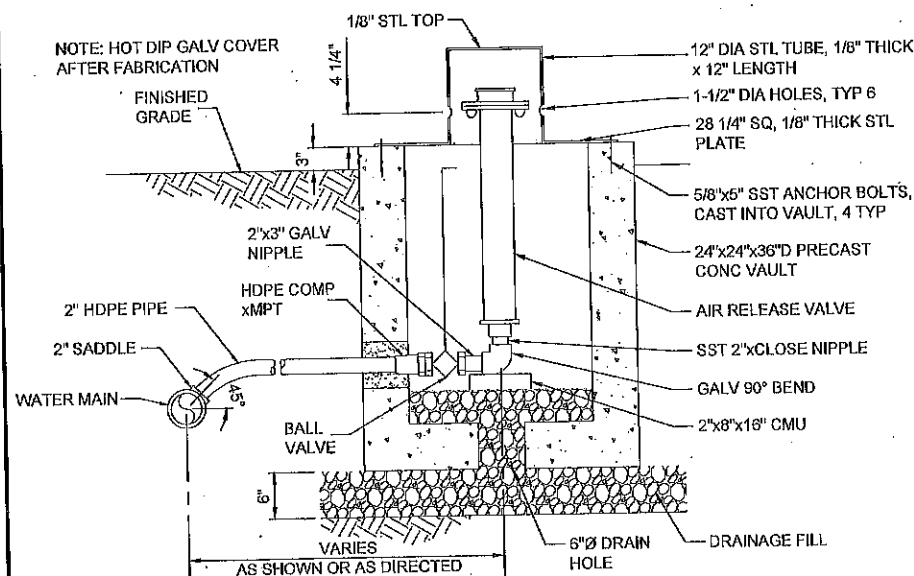
TYPICAL OPEN TRENCH SECTION  
SCALE: NTS

5



TYPICAL FIRE HYDRANT  
SCALE: NTS

2



TYPICAL AIR RELIEF VALVE  
SCALE: NTS

3

TABLE I THRUST (T) AT FITTINGS, IN POUNDS AT 100 PSI WATER PRESSURE					
PIPE SIZE	TEE OR DEAD END	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
1 1/2"	284	401	217	111	56
2"	443	627	339	173	87
2 1/2"	649	918	497	253	127
3"	962	1361	736	375	189
4"	1810	2559	1385	706	355
6"	3739	5288	2862	1459	733
8"	6433	9097	4923	2510	1261
10"	9677	13685	7406	3776	1897
12"	13685	19353	10474	5340	2683
14"	18385	26001	14072	7174	3604
16"	23779	33628	18199	9278	4661

TABLE II SAFE BEARING LOADS (B)	
SOIL	SAFE BEARING LOAD, POUNDS PER SQ. FT.
SOUND SHALE	10000
CEMENTED SAND AND GRAVEL	4000
COARSE AND FINE COMPACTED SAND	3000
MEDIUM CLAY (CAN BE SPADED)	2000
SOFT CLAY	1000
MUCK	0

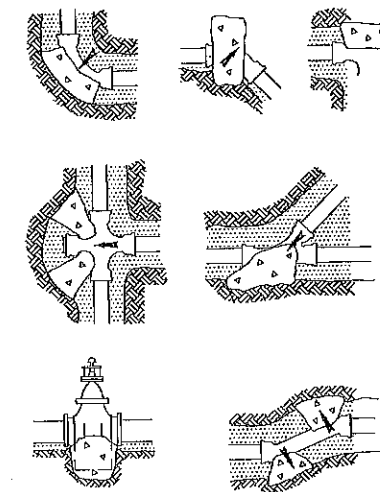
$$A_{SB} = \frac{T \times P_T}{B \times 100}$$

WHERE:

- $A_{SB}$  = AREA OF BLOCK BEARING AGAINST UNDISTURBED TRENCH MATERIAL IN SQ. FT.
- T = THRUST FACTOR FROM TABLE I IN POUNDS AT 100 PSI
- B = SAFE BEARING LOAD FROM TABLE II IN POUNDS/SQ. FT.
- $P_T$  = PRESSURE USED FOR PIPELINE TEST IN PSI

THRUST BLOCK SIZING AND LOCATIONS  
SCALE: NTS

6



NOTE:  
MECHANICAL RESTRAINED JOINTS  
ARE ACCEPTABLE IN LIEU OF  
CONCRETE THRUST BLOCKS.